Experimental Gerontology

VOLUME 32 INDEX
1997

ELSEVIER

EXPERIMENTAL GERONTOLOGY

Affiliated with the International Association of Gerontology

EDITOR-IN-CHIEF

LEONARD HAYFLICK, Ph.D.
University of California, San Francisco, School of Medicine
36991 Greencroft Close
P.O. Box 89
The Sea Ranch, CA 95497
(707) 785-3181 FAX: (707) 785-3809
INTERNET: hayflick.leonard@gene.com

ASSOCIATE EDITORS

William B. Abrams, M.D.
West Point, PA

Richard Adelman, Ph.D.
Ann Arbor, MI

David Aminoff, Ph.D
Ann Arbor, MI

Harold Brody, M.D., Ph.D.
Buffalo, NY

E. R. Buskirk, Ph.D.
University Park, PA

Jeffrey A. Chesky, Ph.D
Springfield, IL

Alex Comfort, M.D.
London, England

Vincent J. Cristofalo, Ph.D.
Philadelphia, PA

Richard G. Cutler, Ph.D.
Baltimore, MD

David Danon, M.D.
Rehovot, Israel

Robert T. Dell'Orco, Ph.D
Oklahoma City, OK

J. Fred Dice, Ph.D.
Boston, MA

David Harrison, Ph.D.
Bar Harbor, ME

Robin Holliday, Ph.D., F.R.S.
Sydney, Australia

Thomas E. Johnson, Ph.D.
Boulder, CO

James A. Joseph, Ph.D.
Boston, MA

Alvaro Macieira-Coelho, M.D., Ph.D.
Paris, France

Takashi Makinodan, Ph.D.
Los Angeles, CA

George M. Martin, M.D.
Seattle, WA

Edward J. Masoro, Ph.D.
San Antonio, TX

Zhores A. Medvedev, Ph.D.
London, England

Joseph Meites, Ph.D.
East Lansing, MI

Jaime Miquel, Ph.D.
Denia, Spain

Masayoshi Namba, M.D.
Okayama, Japan

Paul D. Phillips, Ph.D.
Philadelphia, PA

Dieter Platt, M.D.
Nürnberg, Germany

George S. Roth, Ph.D.
Baltimore, MD

Douglas L. Schmucker, Ph.D.
San Francisco, CA

James R. Smith, Ph.D.
Houston, TX

R. S. Sohal, Ph.D.
Dallas, TX

Bernard L. Strehler, Ph.D.
Los Angeles, CA

Roy L. Walford, M.D.
Los Angeles, CA

Richard Weindruch, Ph.D.
Madison, WI

Matthew Witten, Ph.D.
Ann Arbor, MI

BOOK EDITOR: R. S. Sohal, Ph.D.
FOUNDING EDITOR: Alex Comfort, M.D.

Publishing/Subscription Office: Elsevier Science Inc., 655 Avenue of the Americas, New York, NY 10010-5107, USA.

Published Bimonthly. For customers in Europe, The CIS and Japan: Institutional Rate; NLG 1239.00, Personal Rate: NLG 243.00. For customers in other countries: Institutional Rate: US$ 765.00. Personal Rate: US$ 150.00. Prices include postage and are subject to change without notice. For additional information contact Elsevier Science Customer Support Department, P.O. Box 945, New York, NY 10010. Tel: (212) 633-3730. Toll-Free (for customers in North America): 1-888-4ES-INFO. Fax: (212) 633-3680. E-mail: usinfo-f@elsevier.com

Subscriptions are accepted on a prepaid basis only and are entered on a calendar year basis. Claims for missing issues should be made within six months of our publication (mailing) date. Please address all requests regarding orders and subscription queries to: **The Americas,** Elsevier Science, Customer Support Department, P.O. Box 945, New York, NY 10010, U.S.A. [tel: (+1) 212-633-3730/1-888-4ES-INFO; fax (+1) 212-633-3680; e-mail: usinfo-f@elsevier.com]. **Japan,** Elsevier Science, Customer Support Department, 9-15 Higashi-Azabu 1-chome, Minato-ku, Tokyo 106, Japan [tel. (+81) 3-5561-5033; fax: (+81) 3-5561-5047; e-mail: kyf04035@niftyserv.or.jp]. **Asia-Pacific (*excluding Japan*),** Elsevier Science (Singapore), Pte Ltd, No. 1 Temasek Avenue, 17-01 Millenia Tower, Singapore 039192 [tel: (+65) 434-3727; fax (+65) 337-2230; e-mail: asiainfo@elsevier.com.sg], **Rest of the World**, Elsevier Science, Customer Support Department, P.O. Box 211, 1001 AE Amsterdam, The Netherlands [tel: (+31) 20-485-3757; fax: (+31) 20-485-3432; e-mail: nlinfo-f@elsevier.nl]. For orders, claims, product enquiries (no manuscript enquiries), please contact the Customer Support Department nearest to you.

ELSEVIER

Experimental Gerontology, Vol. 32, No. 6, III–IX, 1997
Copyright © 1997 Elsevier Science Inc.
Printed in the USA. All rights reserved
0531-5565/97 $17.00 + .00

PII S0531-5565(97)00107-1

VOLUME 32

Numbers 1/2

Special Issue
Proceedings of the Second International Conference on Animal Models for Aging Research

Richard L. Sprott	1	Preface
Gerald E. McClearn	3	Biogerontologic theories
Thomas E. Johnson	11	Genetic influences on aging
Steven N. Austad	23	Comparative aging and life histories in mammals
Michael F.W. Festing	39	Experimental design and husbandry
Gerald E. McClearn	49	Prospects for quantitative trait locus methodology in gerontology
Steven N. Austad	55	Issues in the choice of genetic configuration for animal aging models
David E. Harrison and Thomas H. Roderick	65	Selection for maximum longevity in mice
Richard L. Sprott	79	Mouse and rat genotype choices
Gerald E. McClearn	87	Biomarkers of age and aging
Tsutomu Kumazaki, Renu Wadhwa, Sunil C. Kaul and Youji Mitsui	95	Expression of endothelin, fibronectin, and mortalin as aging and mortality markers
Toshio Takeda, Masanori Hosokawa and Keiichi Higuchi	105	Senescence-Accelerated Mouse (SAM): A novel murine model of senescence

Masanori Hosokawa, Toshio Abe, Keiichi Higuchi, Kozo Shimakawa, Yoshiaki Omori, Takatoshi Matsushita, Kumiko Kogishi, Eishi Deguchi, Yoshiko Kishimoto, Kuraichi Yasuoka and Toshio Takeda	111	Management and design of the maintenance of SAM mouse strains: An animal model for accelerated senescence and age-associated disorders
Toshio Takeda, Takatoshi Matsushita, Mafumi Kurozumi, Kiminobu Takemura, Keiichi Higuchi and Masanori Hosokawa	117	Pathobiology of the Senescence-Accelerated Mouse (SAM)
Keiichi Higuchi	129	Genetic characterization of Senescence-Accelerated Mouse (SAM)
Masaomi Miyamoto	139	Characteristics of age-related behavioral changes in Senescence-Accelerated Mouse SAMP8 and SAMP10
Nobuyoshi Nishiyama, Toru Moriguchi and Hiroshi Saito	149	Beneficial effects of aged garlic extract on learning and memory impairment in the Senescence-Accelerated Mouse
Toshio Kawamata, Ichiro Akiguchi, Hideo Yagi, Mika Irino, Hiroshi Sugiyama, Haruhiko Akiyama, Atsushi Shimada, Manabu Takemura, Masaki ueno, Takamichi Kitabayashi, Katsunori Ohnishi, Naoyuki Seriu, Keiichi Higuchi, Masanori Hosokawa and Toshio Takeda	161	Neuropathological studies on strains of Senescence-Accelerated Mice (SAM) with age-related deficits in learning and memory
Ikuo Tooyama, Kazuo Sasaki, Yutaka Oomura, Ai-Jun Li and Hiroshi Kimura	171	Effect of acidic fibroblast growth factor on basal forebrain cholinergic neurons in Senescence-Accelerated Mice
Masamichi Hosono, Keigo Hanada, Eiko Toichi, Hironobu Naiki, Keiichi Higuchi and Tomohide Hosokawa	181	Immune abnormality in relation to nonimmune diseases in SAM mice
Masanori Hosokawa, Hiromi Fujisawa, Zhu Bing-Hua, Hirokazu Jujo and Keiichi Higuchi	197	In vitro study of the mechanisms of senescence acceleration
Richard L. Sprott	205	Diet and calorie restriction
Ruth D. Lipman	215	Pathobiology of aging rodents: Inbred and hybrid models
Masao Kishikawa and Mihoko Sakae	229	Herbal medicine and the study of aging in Senescence-Accelerated Mice (SAMP1TA/Ngs)

Number 3

Richard C. Adelman, George R. Martin and Carol Schutz	243	Obituary: George T. Baker, III
David N. Reznick	245	Editorial: Life history evolution in guppies (*Poecilia reticulata*): Guppies as a model for studying the evolutionary biology of aging
Tarynn Matthew Witten and Tim Eakin	259	Multiphasic models of survival: Analysis of mortality rate change regions and the issue of finite species lifespan
H.R. Hirsch	287	Intersections of mortality-rate and survival functions: Model-independent considerations
Alejandro D. Bolzán, Martha S. Bianchi, Gloria M. Console and Rodolfo G. Goya	297	Relationship between pituitary hormones, antioxidant enzymes, and histopathological changes in the mammary gland of senescent rats
Andrzej Plewka, Marcin Kamiński and Danuta Plewka	305	The influence of age and some inducers on UDP-glucuronyltransferase activity
Hideyoshi Harashima, William F. Ebling, D. Russell Wada and Donald R. Stanski	315	No effect of age on the dose requirement of thiopental in the rat
Vladimir I. Shefer and Mark I. Talan	325	Change in heat loss as a part of adaptation to repeated cold exposures in adult and aged male C57BL/6J mice
	333	Letters to the Editor: The catastrophe theory of aging: Point counterpoint
	347	Letters to the Editor
	351	Book Review

Numbers 4/5

Special Issue
Proceedings of the Third International Symposium on the Neurobiology and Neuroendocrinology of Aging

Richard E. Falvo and Andrzej Bartke	vii	Preface
L. Martini and R.C. Melcangi	355	The brain: A vulnerable target
Michael O. Hengartner	363	Genetic control of programmed cell death and aging in the nematode *Caenorhabditis elegans*
Gregg B. Morin	375	Telomere control of replicative lifespan
Bryant Villeponteau	383	The heterochromatin loss model of aging
T.B.L. Kirkwood and A. Kowald	395	Network theory of aging
Georg Wick and Beatrix Grubeck-Loebenstein	401	The aging immune system: Primary and secondary alterations of immune reactivity in the elderly
N. Fabris, E. Mocchegiani and M. Provinciali	415	Plasticity of neuroendocrine–thymus interactions during aging
S.M. McCann	431	The nitric oxide hypothesis of brain aging
Vladimir V. Frolkis, Saltanat A. Tanin and Yevgeni N. Gorban	441	Age-related changes in axonal transport
G.W. Bennett, T.M. Ballard, C.D. Watson and K.C.F. Fone	451	Effect of neuropeptides on cognitive function
Eugenia Wang	471	Regulation of apoptosis resistance and ontogeny of age-dependent diseases
Hans Nohl, Katrin Staniek and Lars Gille	485	Imbalance of oxygen activation and energy metabolism as a consequence or mediator of aging
Gul N. Shah and Arshag D. Mooradian	501	Age-related changes in the blood–brain barrier
Fred Nyberg	521	Aging effects on growth hormone receptor binding in the brain
B.R. Zirkin, H. Chen and L. Luo	529	Leydig cell steroidogenesis in aging rats
J. Knoll	539	Sexual performance and longevity

M.D. Catalá, C. Cañete-Nicolás, A. Iradi, F.J. Tarazona, J.M. Tormos and A. Pascual-Leone 553 Melatonin levels in Parkinson's disease: Drug therapy versus electrical stimulation of the internal globus pallidus

Michel A. Hofman 559 Lifespan changes in the human hypothalamus

Meinrad Peterlik 577 Aging, neuroendocrine function, and osteoporosis

W. Pierpaoli, D. Bulian, A. Dall'Ara, B. Marchetti, F. Gallo, M.C. Morale, C. Tirolo and N. Testa 587 Circadian melatonin and young-to-old pineal grafting postpone aging and maintain juvenile conditions of reproductive functions in mice and rats

Yvan Touitou, André Bogdan, Erhard Haus and Catherine Touitou 603 Modifications of circadian and circannual rhythms with aging

Number 6

BRUCE A. CARNES and S. JAY OLSHANSKY — 615 Biodemographic Perspective: A biologically motivated partitioning of mortality

DAVID DANON, JACK MADJAR, ELIA EDINOV, AHUVA KNYSZYNSKI, SHAI BRILL, LEAH DIAMANTSHTEIN and EILAT SHINAR — 633 Treatment of human ulcers by application of macrophages prepared from a blood unit

THOMAS O. OBISESAN, MICHAEL J. TOTH, PHILIP A. ADES and ERIC T. POEHLMAN — 643 Central markers of body fat distribution are important predictors of plasma lipids in elderly men and women

ZS. VARGA, M.P. JACOB, L. ROBERT, J. CSONGOR and T. FULOP, JR. — 653 Age-dependent changes of K-elastin stimulated effector functions of human phagocytic cells: Relevance for atherogenesis

ELSA L. MOY, EMMA L. DUNCAN, BHARATI HUKKU and ROGER R. REDDEL — 663 Reassessment of immortalization complementation group D

ZHONG Q. WANG, AUDREY D. BELL-FARROW, WILLIAM SONNTAG and WILLIAM T. CEFALU — 671 Effect of age and caloric restriction on insulin receptor binding and glucose transporter levels in aging rats

MASAHIDE NAKAJIMA, MICHIO HASHIMOTO, FENG WANG, KATSUMI YAMANAGA, NORIFUMI NAKAMURA, TAKESHI UCHIDA and KOICHI YAMANOUCHI — 685 Aging decreases the production of PGI_2 in rat aortic endothelial cells

VLADIMIR I. SHEFER and MARK I. TALAN — 695 The effect of exercise training in a cold environment on thermoregulation in adult and aged C57BL/6J mice

EDWARD L. SPANGLER, JOHN HENGEMIHLE, GRANT BLANK, DOREY L. SPEER, STACIE BRZOZOWSKI, NAMISHA PATEL, and DONALD K. INGRAM — 707 An assessment of behavioral aging in the Mongolian gerbil

DEXTER M. EASTON — 719 Gompertz growth in number dead confirms medflies and nematodes show excess oldster survival

JAMES W. CURTSINGER and AZIZ KHAZAELI — 727 Retraction: A reconsideration of stress experiments and population heterogeneity

731 Book Review

735 Announcement

737 Acknowledgments

I Volume 31 Contents

XI Author Index

XIII Key Word Index

ELSEVIER

Experimental Gerontology, Vol. 32, No. 6, XI–XII, 1997
Copyright © 1997 Elsevier Science Inc.
Printed in the USA. All rights reserved
0531-5565/97 $17.00 + .00

PII S0531-5565(97)00109-5

AUTHOR INDEX

Abe, T., 111
Adelman, R.C., 243
Ades, P.A., 643
Akiguchi, I., 161
Akiyama, H., 161
Austad, S.N., 23, 55

Ballard, T.M., 451
Bell-Farrow, A.D., 671
Bennett, G.W., 451
Bianchi, M.S., 297
Bing-Hua, Z., 197
Black, G., 707
Bogdan, A., 603
Bolzán, A.D., 297
Brill, S., 633
Brzozowski, S., 707
Bulian, D., 587

Cañete-Nicolás, C., 553
Carnes, B.A., 615
Catalá, M.D., 553
Cefalu, W.T., 671
Chen, H., 529
Cónsole, G.M., 297
Csongor, J., 653
Curtsinger, J.W., 727

Dall'Ara, A., 587
Danon, D., 633
Deguchi, E., 111
Diamantshtein, L., 633
Duncan, E.L., 663

Eakin, T., 259
Easton, D.M., 719
Ebling, W.F., 315
Edinov, E., 633

Fabris, N., 415
Festing, M.F.W., 39
Fone, K.C.F., 451
Frolkis, V.V., 441
Fujisawa, H., 197
Fulop., T., Jr., 653

Gallo, F., 587
Gille, L., 485
Gorban, Y.N., 441
Goya, R.G., 297
Grubeck-Loebenstein, B., 401

Hanada, K., 181
Harashima, H., 315
Harrison, D.E., 65
Hashimoto, M., 685
Haus, E., 603
Hengartner, M.O., 363
Hengemihle, J., 707
Higuchi, K., 105, 111, 117, 129, 161, 181, 197
Hirsch, H.R., 287
Hofman, M.A., 559
Hosokawa, M., 105, 111, 117, 161, 197
Hosokawa, T., 181
Hosono, M., 181
Hukki, B., 663

Ingram, D.K., 707
Iradi, A., 553
Irino, M., 161

Jacob, M.P., 653
Jazwinski, S.M., 731
Johnson, T.E., 11
Jujo, H., 197

Kamiński, M., 305
Kaul, S.C., 95
Kawamata, T., 161
Khazaeli, A., 727
Kimura, H., 171
Kirkwood, T.B.L., 395
Kishikawa, M., 229
Kishimoto, Y., 111
Kitabayashi, T., 161
Knoll, J., 539
Knyszynski, A., 633
Kogishi, K., 111
Kowald, A., 395
Kumazaki, T., 95
Kurozumi, M., 117

Li, A.-J., 171
Lipman, R.D., 215
Luo, L., 529

McCann, S.M., 431
McClearn, G.E., 3, 49, 87
Madjar, J., 633
Marchetti, B., 587
Martin, G.R., 243
Martini, L., 355
Matsushita, T., 111, 117
Melcangi, R.C., 355
Mitsui, Y., 95
Miyamoto, M., 139
Mocchegiani, E., 415
Mooradian, A.D., 501
Morale, M.C., 587
Moriguchi, T., 149
Morin, G.B., 375
Moy, E.L., 663

Naiki, H., 181
Nakajima, M., 685
Nakamura, N., 685
Nishiyama, N., 149
Nohl, H., 485
Nyberg, F., 521

Obisesan, T.O., 643
Ohnishi, K., 161
Olshansky, S.J., 615
Omori, Y., 111
Oomura, Y., 171

Pascual-Leone, A., 553
Patel, N., 707
Peterlik, M., 577
Pierpaoli, W., 587
Plewka, A., 305
Plewka, D., 305
Poehlman, E.T., 643
Provinciali, M., 415

Reddel, R.R., 663
Reznick, D.N., 245
Robert, L., 653
Roderick, T.H., 65

Saito, H., 149
Sakae, M., 229
Sasaki, K., 171
Schutz, C., 243
Seriu, N., 161
Shah, G.N., 501
Shefer, V.I., 325, 695
Shimada, A., 161
Shimakawa, K., 111
Shinar, E., 633
Sonntag, W., 671
Spangler, E.L., 707
Speer, D.L., 707
Sprott, R.L., 1, 79, 205
Staniek, K., 485
Stanski, D.R., 315
Sugiyama, H., 161

Takeda, T., 105, 111, 117, 161
Takemura, K., 117
Takemura, M., 161
Talan, M.I., 325, 625
Tanin, S.A., 441
Tarazona, F.J., 553
Testa, N., 587
Tirolo, C., 587
Toichi, E., 181
Tooyama, I., 171
Tormos, J.M., 553
Toth, M.J., 643
Touitou, C., 603
Touitou, Y., 603

Uchida, T., 685
Ueno, M., 161

Varga, Zs., 653
Villeponteau, B., 383

Wada, D.R., 315
Wadhwa, R., 95
Wang, E., 471
Wang, F., 685
Wang, Z.Q., 671
Watson, C.D., 451
Wick, G., 401
Witten, T.M., 259

Yagi, H., 161
Yamanaga, K., 685
Yamanouchi, K., 685
Yasuoka, K., 111

Zirkin, B.R., 529

Experimental Gerontology, Vol. 32, No. 6, XIII—XVI, 1997
Copyright © 1997 Elsevier Science Inc.
Printed in the USA. All rights reserved
0531-5565/97 $17.00 + .00

ELSEVIER

PII S0531-5565(97)00110-1

KEY WORD INDEX

Abnormal behavior, 161
Accelerated senescence, 105, 197
Acclimation, 325
β-Adrenergic receptors, 587
aFGF, 171
Age-associated pathologies, 117
Age at maturity, 245
Age survivorship, 719
Aging, 87, 95, 105, 117, 149, 161, 215, 229, 245, 297, 305, 315, 325, 355, 375, 395, 401, 415, 441, 485, 521, 529, 559, 603, 653, 671, 685
Aging of brain, 229
Aging clock, 383
Aging rates, 65
Alzheimer's disease, 401
γ-Aminobutyric acid, 431
Amyloidosis, 129, 181
Animal models, 23, 55, 105, 161, 707
Antagonistic pleiotropy, 245
Antioxidant enzymes, 297
Antioxidants, 395
Anxiety, 139
ApoA-II, 129
Apoptosis, 363
Arterial blood gas tension, 315
Astrocytes, 355
Atherogenesis, 653
Atherosclerosis, 401
Autopsy findings, 117
Axonal transport, 441

Behavior, 451
Behavioral depression, 139
Bias, 39
Biodemography, 615
Biological clocks, 363
Biological rhythms, 559
Biomarker, 87
Body fat distribution, 643
Body temperature, 695
Bone remodeling, 577
Brain, 161, 355, 521
Brain activation, 539
Brain dysfunction, 229
Brain LHRH receptors, 587

CAE effect, 539
Caenorhabditis elegans, 719
Caloric restriction, 205, 671
Cancer, 375
Carrier transport, 501
Catalase, 297
Catecholaminergic activity enhancer (CAE), 539
Cell cycle, 11
Cell cycle traverse, 471
Cell death genes, 363
Cell immortalization, 375
Cellular senescence, 375, 383
Censoring, 259
Cerebral microvessels, 501
Change point models, 259
Cholesterol synthesis, 653
Choline acetyltransferase, 171
Chromatin structure, 383
Circadian rhythm, 139, 603
Circannual rhythm, 603
Cognitive function, 451
Cold acclimation, 695
Cold tolerance, 695
Colonic temperature, 325
Comparative aging, 23
Comparative studies, 245
Complementation, 663
Complexity, 3

Congenic mouse, 129
Conventional condition, 111
Cut point, 259
Cyclooxygenase, 431
Cytokines, 431

Dauer formation, 363
Death factors, 471
Deceleration, 441
Decubital ulcers, 633
(-)Deprenyl, 539
DNA fingerprinting, 663
Dopamine, 431
Drug therapy, 553

EEG dose requirement, 315
Effect of environment on aging, 181
Elastase activity, 653
Elastin receptor, 653
Elderly men and women, 643
Electrical stimulation, 553
Emotional behavior, 139
Endothelial cells, 685
Endothelin, 95
Epilepsy, 707
Evolution, 23
Experimental design, 39
Extrinsic time, 259

FGFR-1, 171
Fibroadenoma, 297
Fibroblast-like cells, 197
Fibronectin, 95
Finite species lifespan, 259
Four-way cross, 65
Free radicals, 395

GABAa receptor, 355
Garlic, 149
Generalizability, 87
Gene regulation, 383
Gene silencing, 383
Genes and environment, 3
Genetic models, 79
Genetics, 11, 65, 129
Genetic variation, 55
Genome mapping, 129
Gerontology, 215
Glial-neuronal interactions, 355
Glucose, 671
Glucose transporters, 671
Glutamic acid, 431
Gompertz, 259
Gompertz function, 129
Gompertz growth, 719
Gompertz kinetics, 719
Gonads, 587
Growth factors, 355
Growth hormone, 521
G_1/S border, 471

Heart, 485
Heat conservation, 325
Heat loss, 695
Heat production, 325, 695
Hemodynamics, 315
Herbal medicine, 229
High-performing rat, 539
Hippocampus, 171
Hormonal regulation, 441
Hormones, 577
Human brain, 559
Human genes, 11
Hybrid, 215
Hypothalamic hormones, 355
Hypothalamic releasing and inhibiting hormones, 431
Hypothalamus, 559
Hypothesis testing, 23
Hypoxia, 441

Immortalization, 663, 95
Immune system, 401
Immunological aging, 181
Inbred, 215
Inbreeding, 55, 111
Inducers, 305
Inflection time, 259
Insulin, 671
Insulin binding, 671
Intracellular calcium, 685
Intrinsic mortality, 615
Intrinsic time, 259
In vitro aging, 197
Irradiation, 441
Ischemia/reperfusion, 485

Learning, 149, 707
Learning and memory, 139
Learning performance, 539
Leydig cell, 529
LHRH-producing GT1 cell line, 355

Life history evolution, 245
Life span, 129, 205, 363
Liver, 305
Longevity, 49, 65, 539, 719
Low-performing rat, 539

Macrophages, 633
Maintenance, 111
Makeham, 259
Mammals, 23
Mammary hyperplasia, 297
Maximum lifespan, 259
Mean lifespan, 259
Medflies, 719
Medial septum, 171
Melatonin, 415, 553, 587
Membrane alterations, 485
Memory, 149, 707
Mice, 79, 205, 215, 325
Mitochondria, 395, 485
Monocytes, 633
Mortalin, 95
Mortality partitioning, 615
Mortality rate, 259
Mortality-rate functions, 287
Motor skills, 707
Multiphasic mortality rate, 259
Multiphasic survival curve, 259
Murine leukemia proviruses, 129
Mutation accumulation, 245

Network theory, 395
Neurodegenerative diseases, 431
Neuroendocrine, 415
Neuroendocrine regulation, 577
Neurons, 355
Neuropeptides, 451, 559, 577
Neurotransmitters, 577
Nitric oxide synthase, 431
Norepinephrine, 431
Nutrition, 215

Old patients, 633
Outbreeding, 55
Oxygen free radicals, 485

Parameter estimation, 259
Parkinson's disease, 553
Passive diffusion, 501
Pathobiology, 117
Pathologic phenotypes, 105, 117
Pathology, 215
Phagocytic cells, 653
Phagocytosis, 653
Pharmacodynamics, 315
Pharmacokinetics, 315
Pineal gland, 587
Pituitary hormones, 297
Plasma lipids, 643
Poecilia reticulata, 245
Position effects, 383
Postmortem examination, 117
Precision, 39
Programmed cell death, 471
Prolactin, 297
Prolongation of life, 539
Prostacyclin, 685
Protonophores, 485

Quantitative genetics, 3
Quantitative trait loci, 49

Randomized blocks, 39
Rats, 79, 205, 215, 305, 315, 529, 685
Receptor binding, 521
Receptors, 671
Recombinant inbred strains, 49
Reliability, 87
Replicative senescence, 471
Reproductive effort, 245
Reproductive hormones, 587
Respiratory burst, 653
Risk factors, 471

SAM, 105, 111, 117, 129, 149, 161, 229
SAM model, 181
SAMP8, 139, 171
SAMP10, 139
SAMPITA/Ngs, 229
Selection, 65, 111
Semiquinone, 485
Senescence, 117, 245, 375, 663
Senescence-accelerated mouse, 105, 111, 117, 129, 139, 149, 161, 171, 197, 229
Sexual aging, 587
Sexual dimorphism, 559
Sexual performance, 539
Signal transduction pathway, 471
Skeletal system, 577
Soluble guanylate cyclase, 431
Somatic cell hybrids, 663

Specific pathogen free, 111
Statistics, 39
Steroidogenesis, 529
Steroids, 355
Superoxide dismutase, 297
Superoxide production, 653
Survival, 259
Survival factors, 471
Survival functions, 287
Survival kinetics, 719
Systems theories, 3

Telomerase, 375, 383
Telomeres, 375, 383
Testes, 587
Testosterone, 529, 587
Thermoregulation, 325
Thiopental, 315
Thromboxane A_2, 685
Thymus, 415, 587
Thyrotropin-releasing hormone, 451
Tolerance, 315
TRH, 451

UDP-glucuronyltransferase, 305
Uniformity, 55

Vaccination, 401
Validity, 87

Weibull, 259
Wound healing, 633

Xenobiotics, 485

Zinc, 415